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GOVERNMENT OF TRIPURA
URBAN DEVELOPMENT DEPARTMENT

NO.F.16(21)-UDD/DUD/2019/11760-35 **Dated, Agartala, The 21st Dec, 2019.**

NOTIFICATION

As per Rule 9(1) of the Construction and Demolition Waste Management Rules, 2016 issued by Ministry of Environment, Forest and Climate Change, Government of India, the State Government is hereby notifying the " The Tripura Construction and Demolition Waste Management Policy, 2019".

This shall come into force from the date of notification published in the official gazette.

By order of the Governor,

21/12/19

(Dr. Milind Ramteke, IAS)
Additional Secretary to the
Government of Tripura

1. INTRODUCTION

With rapid urbanization in the state of Tripura, one of the fastest growing industries is construction and it is expected to continue growing exponentially with the increase in urban population. Increase in the number of buildings, expansion of urban infrastructure (such as roads, bridges, flyovers, housings etc.) and demolition of old buildings has also resulted in immense amount of waste being generated in the form of debris, building materials etc. In addition, with increased urbanization and infrastructure creation, there is a shortage of conventional building materials such as aggregates, sand and significant increase in the price of building materials such as concrete and bricks. Therefore, to deal with the issue of rising C&D Waste generation in India, challenge of C&D Waste recycling and sustainable use of natural resources, the Government of India issued the Construction and Demolition Waste Management Rules, 2016 ("**C&D Rules**") in March 2016. They apply to every waste resulting from construction, remodeling, repair and demolition of any civil structure of individual or organization or governmental authority that generates construction and demolition waste.

Construction and Demolition Waste (also referred to as C&D Waste) is defined by the C&D Rules as the waste comprising of building materials, debris and rubble resulting from construction, remodeling, repair and demolition of any civil structure.

The activities that mainly generate C&D Waste are

(i) Construction of new buildings,

(ii) Renovation of existing buildings

(iii) Demolition of old buildings

(iv) Excavation/laying of asphalt/concrete roads

(v) Installation and service of public utilities (telephone/water/electricity/sewage pipelines)

(vi) Construction /renovation of public infrastructure (bridges/flyovers).

The composition of C&D Waste is city-specific as well as project-specific a differs according to the rate of urbanization, the pace of developmental activi and re development of the city. The composition also varies according to t project and depends on the age and type of building. Generally, however as p the study carried out by Technology, Information, Forecasting and Assessme Council (TIFAC), the typical composition of C&D Waste in India is shown belov

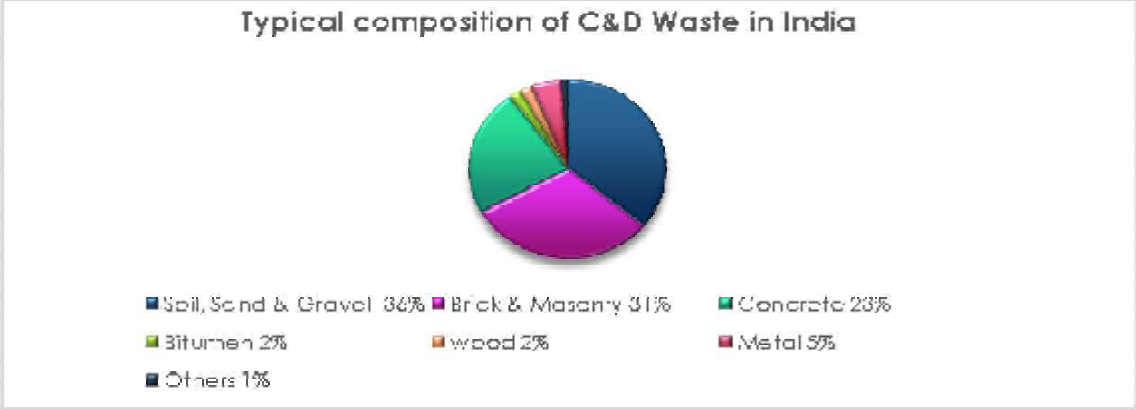

Figure 1: Typical composition of C&D Waste in India

Currently in India, C&D Waste management is in a nascent stage, where a portion of C& D waste is used for filling and leveling low lying areas and some resources are recovered from C&D Waste. However, a majority of C&D Waste is dumped in landfills or is illegally disposed of in water bodies, rivers and ponds. It is also common to see C&D Waste littered on pavements and in open plots (this practice is known as fly tipping). Such waste is often mixed with municipal solid waste making the municipal waste heavy and unsuitable for further processing such as composting, recycling or energy recovery. Given that material costs comprise nearly 40 to 60 percent of the project cost in the

construction industry, sustainable management of C&D Waste can result in significant cost savings for industry and other stakeholders. Therefore, the dumping practices are not only unsustainable but also lead to a loss of resources as C&D Waste can be recycled into reusable products which greatly reduce the stress on the mining of virgin materials. The processing of the C&D Waste also reduces the total amount of inert wastes that are disposed of in landfills.

The issue of C&D Waste has entered the public discourse relatively recently and therefore, there have been historically very little efforts to keep records of its generation and composition. In addition, C&D Waste is often clubbed with solid waste and thus, the magnitude of the problem is underestimated by all stakeholders involved. This has resulted in no formal system for prevention, reduction, management, reuse and recycling of C&D Waste. The Technology, Information, Forecasting and Assessment Council (TIFAC) considers approximately 25% of all solid waste to be C&D Waste and therefore, using this metric, it can be estimated that the state of Tripura has produced 116 TPD of C&D Waste during the year 2018-19 (assuming it had generated 463 TPD of solid waste during the same year as per the TSPCB Annual Report).

Under Rule 9(1) of the C&D Rules, the Secretary in-Charge of Urban Development Department in the State Government is required to prepare the state policy document with respect to management of construction and demolition of waste in accordance with the provisions of C&D Rules. Pursuant to this provision, this policy and strategy on C&D Waste, the "**Tripura Construction & Demolition Waste Management Policy-2019**" is being prepared for the State of Tripura to sustainably manage the C&D Waste which is increasingly being generated within its jurisdictions. This policy and

strategy is aimed at relevant authorities, other functionaries of ULBs and other stakeholders to prepare the plans and procedures for management of C&D Waste within their jurisdictions.

2. OBJECTIVES

The objectives of the Tripura State Construction and Demolition Waste Management Policy (**"Tripura C&D Waste Management Policy"**) are:

1. To ensure that no C&D Waste is dumped in open spaces by 2021.

2. To ensure at least 50% of C&D Waste generated is reused or recycled by 2021.

3. PRINCIPLES FOR MANAGEMENT OF C&DWASTE

The State of Tripura should focus on the 3R principle (i.e. reduce, reuse and recycle) for the management of C&D Waste generated within the state. This should be done in the following manner:

Source reduction measures such as preservation of old buildings, optimization of space in new buildings, designing building and infrastructure which reduce use of construction and material onsite.

Using deconstruction[1]prior to demolition to salvage reusable materials from the construction site where the items which are usable directly are screened out from the debris and put into the intended use without further processing. These could include useful products like doors and windows, bricks, reinforcement, structural steel that can be taken out with little extra efforts

[1]*Deconstruction is defined by the C&D Rules as a planned selective demolition in which salvage, re-use and recycling of the demolished structure is maximized.*

and put into reuse without much processing. Therefore, it is recommended that prior to any demolition activity that takes place the waste generator deconstructs the building whereby the building is dismantled, and any salvageable re-usable materials are collected and used on-site or on another site.

Once the C&D Waste has been segregated and reusable items are taken out, the leftover waste should be recycled to the extent possible. This is also vital for ensuring that minimum amount of waste is sent to landfills. Only rejected waste from the C&D recycling process should be disposed of in sanitary landfills.

4. FLOW OF C&D WASTE FROM GENERATION TO DISPOSAL

"Waste Generator" is defined by the C&D Rules as any person or association of persons or institution, residential and commercial establishments including Indian Railways, Airports, Ports and Harbors and Defense Establishments who undertake construction or demolition of any civil structure which generate C&D Waste. Waste generators who generate more than 20 metric tonnes or more in one day or 300 tonnes per project in a month have been identified separately in the C&D Rules and have additional obligations attached to them. For the purposes of the Tripura Construction and Demolition Waste Management Policy 2019, this category of the waste generators will be considered as "**Bulk Waste Generators**".

The third category of waste generators identified in the C&D Rules is the "**Service Providers**" and are defined as authorities who provide services like water, sewerage, electricity, telephone, roads, drainage etc. who often generate C&D Waste during their activities, which includes excavation, demolition and civil work.

The figure below describes the flow of C&D Waste from generation to disposal including all the intermediate steps/activities such as collection, processing/recycling and disposal.

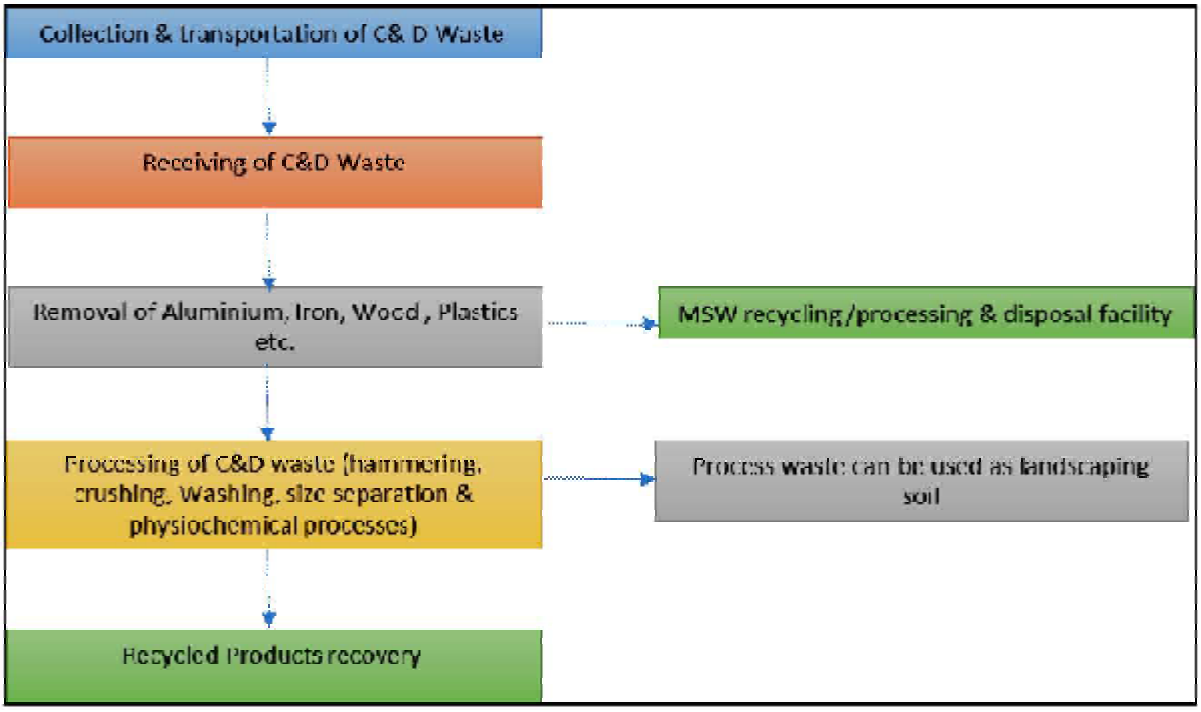
Collection & transportation of C& D Waste
Receiving of C&D Waste
Removal of Aluminium, Iron, Wood, Plastics etc.
MSW recycling/processing & disposal facility
Processing of C&D waste (hammering, crushing, washing, size separation & physiochemical processes)
Process waste can be used as landscaping soil
Recycled Products recovery

Figure 2: Flow of C&D Waste

The following paragraphs contain an overview of the requirements relating to segregation, storage, collection, transportation and aggregation of C&D Waste by different categories of waste generators.

5. SEGREGATION AND IN SITU STORAGE

As per the C&D Rules, every waste generator is responsible for collection, segregation and storage of C&D Waste that they generate. The generator is required to ensure that other waste (such as solid waste and hazardous waste) does not get mixed with the C&D Waste and that the C&D Waste is

stored and disposed of separately. Every waste generator is mandated to keep the C&D Waste within the premises or get the waste deposited at collection Center made available by the ULB or handover it to the authorized processing facilities of C&D Waste and ensure that there is no littering of such waste.

Bulk waste generators are required to segregate their C&D Waste into four streams such as

(a) Concrete **(b)** soil **(c)** steel, wood and plastics and **(d)** bricks and mortar. Service Providers who are defined by the C&D Rules as authorities who provide services like water, sewerage, electricity, telephone, roads, drainage etc. who often generate C&D Waste during their activities, which includes excavation, demolition and civil work are required by the C&D Rules to include a plan for segregation in their comprehensive waste management.

Bulk waste generators should maintain dedicated hook loader bins or skips that should be kept within the construction sites. The ULB, through itself or an authorized private party, should consider renting open skips and/or tractor trolleys to bulk waste generators for in situ storage of C&D Waste. In case of smaller ULBs where skips and tipping trailers are not available, manual loading and unloading could be permitted provided all necessary safety precautions are taken to ensure that all accidents are avoided. Once these containers are full, the bulk waste generators should inform the ULB or the authorized private party to replace the filled skip or trolley with an empty one. In case of bulk waste generators responsible for construction, demolition, or renovation of large commercial or housing projects, infrastructure such as metros, roads, bridges or flyovers or demolition of unstable, old or unauthorized structures etc., the area should be cordoned off and the C&D Waste should be segregated and stacked separately without obstructing any public road or causing any hindrance. As per the CPHEEO Manual 2000[4], if the

[4]CPHEEO Manual 2000 (Chapter – IV)

construction debris is stored in skips, then skip lifters fitted with hydraulic hoist system should be used for efficient and prompt removal. In case, trailers are used, then tractors may remove these. For handling very large volumes, front end loaders or back hoes in combination with sturdy tipper trucks may be used so that the time taken for loading and unloading is kept to the minimum.

For small generators of C&D Waste (such as waste resulting from petty construction, repair or maintenance works), ULB could consider two options, **(a)** deposit of C&D Waste by the small generators at collection centers; or **(b)** removal of the C&D Waste by the ULBs through itself and/or authorized private party on payment basis.

6. COLLECTION, TRANSPORTATION AND SECONDARY STORAGE/ AGGREGATION

Under the SWM Rules 2016, ULBs are required to ensure separate storage, collection and transportation of C&D Wastes within April 2020. Further, under C&D Rules, ULBs are required to make arrangements for collection and transportation of C&D Waste to processing and disposal facilities, either through themselves or by appointing private operators.

Bulk Waste Generators are responsible for transporting their waste to the processing plant and/or transit stations either by themselves or through a contracted agency.

Non bulk waste generators may contact the ULB through an online portal, by telephone or any other prescribed method for the transportation of their C&D

Wastes. ULB may transport the wastes to the collection center by themselves or through a contracted agency.

Under the C& D Rules, the service providers are required to remove all C&D Waste and clean the area every day. In the event this is not possible, a reasonable time frame shall be worked out in consultation with the concerned ULB which shall depend upon the duration of the work, the quantity and type of waste generated and appropriate storage and collection. In the event the service providers do not have the appropriate logistics and infrastructure to carry out these activities, they can tie up with authorized agencies for removal of C&D Waste and pay the charges as notified by the ULB.

Given the distinct nature of C&D Waste and to ensure that it is not mixed with other streams of municipal solid waste and hazardous waste, ULB must maintain different vehicles for transportation of municipal solid waste, C&D Waste and hazardous waste. If the ULB has shortage of manpower, vehicles or lacks necessary funds to maintain its own fleet, it is recommended that the ULB may engage competent private entities through tender and/or any other authorised mechanism for collection and transportation of the C&D Waste. To the extent possible, collection and transportation of C&D Waste should be done at night or early morning to avoid any obstruction, hindrance and/ or nuisance in public spaces and roads.

Larger ULBs such as municipal corporations and municipal councils may set up a suitable number of transit stations where bulk waste generators may deposit their segregated C&D Wastes for a tipping fee. This tipping fee should include the costs of onward transportation of the deposited C&D Waste to centralized processing facility. The number and size of transit stations should

take into account population, the amount of C&D Waste being generated within the ULB limits, availability of space, development plans for the ULB among others.

These collection centers and transit stations may be set up to ensure that waste generators and transporters of the C&D Waste do not dump the wastes in vacant open spaces due to the distance between the source of the C&D Waste and processing facility. The ULB could consider setting up collection centers/transit stations on its own land or by inviting private parties to set up decentralized transit stations which will serve as decentralized aggregation points for the centralized C&D Waste processing facility. Typically, this should be close to the construction projects in the municipal development areas. These sites shall be designated/ notified and thereafter publicized by the ULB for deposition of C&D Waste from respective areas. Private parties who are desirous of allowing temporary C&D Waste storage on their privately owned land for a tipping fee may submit an application with an application fee to the ULB. The ULB may issue a 'designated collection center/transit station 'certificate after assessing the suitability of the site for storage of C&D Waste and specifying any further terms and conditions. The C&D Waste deposited at each collection center/transit station may be weighed and records of such waste should be maintained so that the amount of waste generated can be quantified at this level.

With regard to transportation of C&D Waste, the ULBs may consider the following:

1. All ULBs may arrange, through themselves or authorized private agencies for transportation of C&D waste generated by small waste generators from source and for the C&D waste deposited at collection

centers and transit stations. This may be done by suitable vehicles such as tractor trolleys and sturdy tipper trucks.

2. Waste at source by bulk waste generators either departmentally or through an authorized private operator.

3. All ULBs should prescribe rates for collection, transportation and storage of C&D Waste and should widely publicize such rates on its websites, offices, local newspapers and public spaces.

Given that majority of the C&D Waste is currently transported by private agencies that are not monitored, it is not accounted for and dumped in open spaces and illegal sites. Therefore, if the ULBs propose to continue using private agencies for collection and transportation of C&D Waste, it is imperative to register, regulate and monitor such agencies. They should be registered and mandatorily required to deposit the C&D waste to the collection center/transit site and/processing facility. The ULB should make use of advanced information management, mapping, and communication technologies such as GPRS, GPS etc. for monitoring and efficiency of the collection systems.

7. PROCESSING OF C&D WASTE

Recycling of C&D Waste is essential because it reduces the dependence on natural resources and eliminates adverse environmental impacts such as mining for virgin materials. Recycling of C&D wastes also reduces the quantum of C&D waste resulting at landfills and open spaces. Additionally, under the C&D Rules, ULBs are required to make arrangements for the processing and disposal of C&D Waste, either through itself or by appointing authorized agencies.

8. RECYCLING PROCESS AND RESULTING PRODUCTS

The recycling of C&D Waste is primarily divided into the wet and dry process. The dry recycling process involves

(a) Segregation into streams such as bricks, concretes etc and removal of materials such as large metal scraps, cardboard, paper, plastic and wood from the C&D Waste

(b) Primary and secondary crushing of the cleaned C&D Waste to reduce the size of the material and

(c) Screening of the particles for extracting aggregates of various sizes. In the wet process after secondary crushing and screening the material is washed and screened again to remove loose soil and grit.

The wet process reduces the residue (loose soil and grit) which cannot be converted into recycled products. The selection of the appropriate process for recycling of C&D waste should take into account factors such as the type of soil and other geological conditions, quality of segregation, use of end products etc. For example, using the wet process with black soil would create sludge rather than washing away the residue.

C&D Waste such as concrete and bricks can be crushed and used as coarse or fine aggregates while soil, sand and gravel can also be reprocessed for productive use as fine aggregates. These finished products can be used for non-structural purposes such as making of kerbstones, paver blocks, bricks etc. Coarse and fine aggregates can also be used as a part replacement for natural sand.

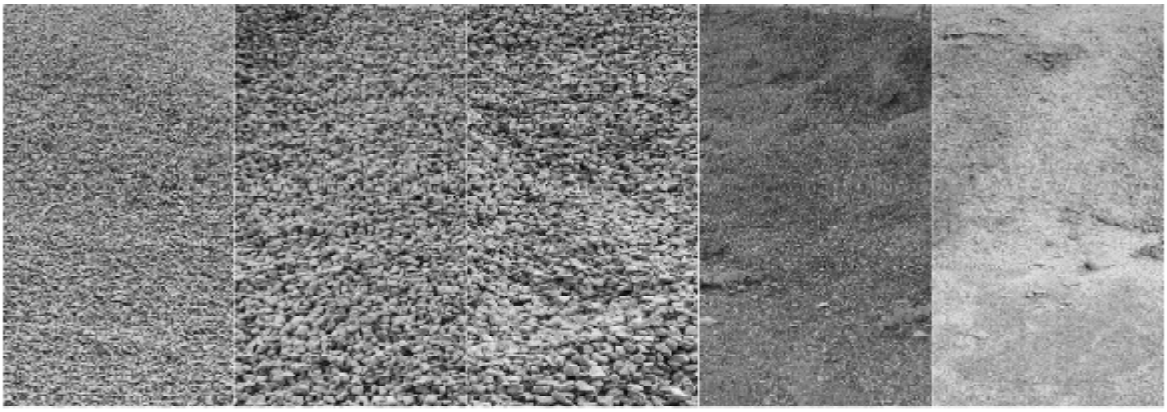

Figure 3: Recycled Product-Different Grades and Sizes of Aggregate

Set out below is an overview of the process of recycling components of C&D Waste and their respective end-use.

Table 1: Table of Materials, Process and End Products[3]

Material	Process	End-Use
Concrete	Crushed and mixed Crushed and screened	New cement blocks/ bricksa/pavers etc.
Dirt	Sorted	Landscaping/Landfill cover
Reinforced concrete	Crush sorted, and steel bar removed. Steel recycled.	Crushed, sorted aggregate. For recycling
Clay bricks and roof tiles	Cleaned, Crushed and sorted. Pulverized	Reused for Masonry Aggregate mixed with lime to produce mortar
Calcium silicate bricks	Cleaned Crushed Pulverized	Reused for masonry Aggregate Recycled into new Calcium Silicate bricks

[3]*Waste to Wealth (A Ready Rekoner for Selection of Technologies for Management of Municipal Waste) prepared by Ministry of Housing and Urban Affairs, Government of India released on October 02, 2017, page 72 and Municipal Solid Waste Management Manual, Vol: II, CPHEEO, Ministry of Urban Development, 2016, page 341.*

Natural stone masonry	Cleaned Crushed	Reused for masonry Aggregate
Natural stone slabs	Cleaned, Crushed	Flooring, cladding, aggregate
Ceramic Tiles	Cleaned, Crushed	Flooring, cladding, aggregate
Asphalt Paving	Crushed and cold mixed Crushed and hot mixed	Road construction excluding wearing course
Mixed demolition waste	Crushed	Fill material
Steel	Cleaned Recycled	Reused steel components New steel components
Aluminum	Cleaned Recycled	Aluminum recycled streams
Timber beams, doors	Cleaned	Reused as shuttering and other products Feedback for engineered woods
Plastics	Recycled	Plastic recycling stream
Gypsum plasterboard	Cleaned	Reuse as boards
	Crushed Recycled	Soil conditioners New gypsum products
Glass	Cleaned Crushed Recycled	Glass recycling streams

9. C&D PROCESSING FACILITIES

Under C&D Rules, ULBs are required to identify and commission facilities for collection and processing C&D Waste within the following timelines:

Table 2: Timelines for C&D Rules compliance

Sl. No.	Action/compliance	All ULBs
1.	Identification of sites for collection and processing facility	Within March 2020
2.	Commissioning C & D Waste Processing Unit	Within December 2020

It is recommended that larger ULBs such as Agartala Municipal Corporation, Udaipur Municipal Council and Dharmanagar Municipal Council may set up C & D processing units for generation of eco-bricks, paver blocks, kerbstones, tiles etc. from the C & D waste through private entrepreneurs on buy-back basis so as to ensure financial sustainability. The eco bricks, paver blocks, kerbstones, tiles etc. prepared in the processing plant should be utilized by the ULB for day to day construction and operation and maintenance works, instead of procuring the same from open market.

ULBs also need to ascertain the quantum of C&D waste generation and its potential utilization taking into account the existing development / infrastructure projects and proposed regional plans with respect to compatible land uses in consultation with TSPCB. This will help the ULB in setting up the storage, processing and recycling facilities for C&D Waste in appropriate and practical locations within the jurisdictional limits of the ULB.

For existing stone crushing units with substantial idle capacity, it makes a good case to invest in the processing of C&D Waste if there is a market for C&D recycled products. In addition, it is recommended that the ULB invite private parties in a manner compliant with General Financial Rules 2017 to set up processing facilities in the state using a Public Private Partnership (PPP) model such as Build, Operate, Own (BOO) or Build, Operate, Transfer (BOT). It is recommended that ULBs wherein current generation of C&D

Waste is greater than 2000 TPD, should set up more than one plant for recycling of C&D waste. Where availability of land is a concern, the ULB could operate mobile or semi mobile C&D waste processing plants.

The processing/ recycling facilities for C&D Waste should comply with provisions of SWM Rules 2016 and C&D Rules and the sites for such facilities should be selected as per the given criteria in Schedule I of the C&D Rules. In addition, the processing facilities should also comply with the requirements especially with respect to pollution relating to noise and dust as set out under Guidelines on Environmental Management of Construction & Demolition (C&D) Wastes issued by the CPCB in March 2017 and Guidelines on dust mitigation measures in handling construction material and C&D Waste issue by CPCB in November 2017.The ULB should conduct regular inspections to check if processing facilities comply with these applicable law and guidelines. As per the C&D Rules, 2018, TSPCB is required to monitor C&D Waste processing facilities at the following minimum frequency: **(a)** 3 times a year, i.e. once in 4 months for ULBs having a population of more than 10 lakhs; **(b)** 2 times a year, i.e. once in 6 months for ULBs having a population less than 10lakhs.

Each load of C&D Waste brought to the processing facility should be inspected and weighed to ensure that no other stream of waste is accepted at the facility and records relating to processing of wastes are maintained. With respect to health and safety of the personnel working at the facility, it should be ensured that personal protective equipment are provided to all personnel. In addition, operators of the processing facility are responsible to ensure that proper training with respect to plant and machinery, accident protocol, fire safety equipment and health concerns are conducted regularly.

In order to minimize the environmental impact, all the C&D processing/recycling facilities shall maintain a setback distance or buffer zone in line with the guidelines on setback distances (or buffer zone distance) given in CPCB Guidelines on Environmental Management Of Construction & Demolition (C&D) Waste, 2017. ULBs in consultation with TSPCB should prescribe buffer zone on case to case basis considering all the environmental, social and economic factors.

The ULBs could consider incentivizing the generators by providing a discount in the costs associated with building permits or reduction in the rental amounts for lease of skips, loaders and other containers. In addition, the ULBs could consider offer a rebate of compliance deposit (such as 1% to 2%) where the waste management plans which provide for waste minimization, reuse and onsite recycling plans. Another mechanism which the ULBs can explore is to formulate schemes along with building ratings like Green buildings are rated by Green Rating for Integrated Habitat Assessment (GRIHA), LEED etc. that recognize and promote builders/developers who use sustainable building practices.

10. MARKET DEVELOPMENT &PROMOTION OF REYCLED PRODUCTS

Given that the capital investments involved in equipment and facilities required for recycling C&D Waste are significant, development of the market for recycled aggregates is critical for economic viability of C&D waste processing facilities. The CPCB has stated that **(i)** the building construction products manufactured from C&D wastes have been reported to satisfactorily meet necessary requirements of compressive strength and water absorption; **(ii)** the end products such as kerbstones, paving blocks, hollow and solid blocks, manufactured sand etc. have been tested in laboratories and found to be satisfactory; and **(iii)** use of fine aggregates and coarse aggregates

manufactured by recycling of C&D Waste have also been validated scientifically for part replacement of natural aggregates[4]. However, there is currently a lack of awareness and incentives among the stakeholders in the construction industry to use C&D recycled products.

In a bid to promote recycled C&D products into the mainstream, the following initiatives have been taken by differential government authorities:

1. Under C&D Rules, ULBs are required to make provision for giving incentives for use of material made out of C&D Waste in the construction activity including in non-structural concrete, paving blocks, lower layers of road pavements, colony and rural roads. Further, the state government is mandatorily required to procure materials made from C&D Waste up to a certain percentage (10-20%) in municipal and government contracts subject to strict quality control.

2. The Bureau of Indian Standards (BIS) has amended specification for coarse and fine aggregate for concrete (Third Revision) (IS: 383-2016) to include "manufactured aggregates produced from other than natural sources" for use in the production of concrete for normal structural purposes including mass concrete works. These manufactured aggregates are of two types namely:

    a) Recycled Aggregate (RA): It is made from C&D waste which may comprise concrete, brick, tiles, stone, etc.

    b) Recycled Concrete Aggregate (RCA): It is derived from concrete after requisite processing.

[4]*Guidelines on Environmental Management of Construction & Demolition (C&D) Wastes issued by the CPCB in March 2017*

Set out below is revised IS 383: 2016 Indian Standard coarse and fine aggregate for concrete – specification (third revision):

Table 3: Standards for Aggregates and their utilization

C&D Waste BIS IS: 383	Plain Concrete	Reinforced Concrete	Lean Concrete (< M15 grade)	Extent of Utilization
Recycled Concrete Aggregate (RCA)	25%	20% (only upto M25 grade)	100%	as Coarse Aggregate
Recycled Aggregate (RA)	Nil	Nil	100%	as Coarse Aggregate
Recycled Concrete Aggregate (RCA)	25%	20% (only upto M25 grade)	100%	as Fine Aggregate

National Building Code (NBC CED 46) of India 2005: Part 11 of NBC 2005 on 'Approach to Sustainability' (Chapter 11), states that:

1. Recycled Coarse Aggregate may be used in concrete for bulk fills, bank protection, base/fill of drainage structures, pavements, sidewalks, kerbs and gutters etc.
2. Up to 30% of natural crushed coarse aggregate can be replaced by the recycled concrete aggregate.
3. This percentage can be increased up to 50% for pavements and other areas which are under pure compression specific to the standards and practices pertaining to construction of roads.'

Central Public Works Department (CPWD) has recommended use of recycled portions of C&D wastes in their construction activities or if the same is available within 100 km from construction site. In addition, CPWD, promotes (a) maximum of 20% replacement of aggregates in RCC with RCA and (b) 100% replacement of aggregates with RCA in light or non-load bearing lean concrete.

As a first step, it is recommended that all government agencies and departments should include the use of products made from C&D Waste for appropriate use in government contracts, tender and institutional purchase mandates. Such products/material should also be included in the PWD schedule of rates. The extent of use of such products and the type of contracts/ tenders where such use should be described and mandated by the technical experts within the relevant departments and agencies. In addition, to compete against traditional building materials, C&D recycled products will require certification from credible testing authorities as cheaper substitutes without compromising on strength and other important aspects. The appropriate governmental agency should also introduce standardization and testing norms for C&D product which is essential for acceptance of C&D recycled products among the ultimate consumers, especially for non-structural applications. Furthermore, as and when C&D Waste recycling plant is commissioned at a ULB, it may be made mandatory for all construction activities to use a specified percentage of building construction materials manufactured from recycled C&D Waste.

In addition, government agencies and service providers inviting tenders for any construction or infrastructure should specifically require that C&D Waste should be processed or disposed in accordance with applicable law. The

tender could also specify in the tender document/ work contract the designated location for disposal or processing of the C&D Waste generated from the project.

ULBs, Tripura Urban Planning and Development Authority (TUDA), Tripura Housing Board (THB), Public Works Department (PWD) etc. can play a major role in dismissing the notions on the suitability of the use of C&D recycled products through recognition of C&D Waste products as genuine substitutes for conventional products. This can encourage private players to follow suit. This will ensure market development for the recycled products making them economically viable for recyclers and reduce subsidy burden on civic bodies. Building ratings like GRIHA, LEED etc. should explore factoring a building's resource consumption, waste generation and utilization of C&D Waste/recycled products in the certification issued by them with respect to "green buildings"/ "green rating" and other ecologically sound construction.

Finally, similar to plastic waste, C&D Waste can also be used in construction of roads as filler or forming a sub-base layer. ULBs can explore the potential to use of a certain percentage of C&D recycled products in construction of roads which do not experience heavy traffic load.

11. WASTE MANAGEMENT PLAN

Under C&D Rules, the C&D bulk generators are required to submit a waste management plan and get appropriate approvals from the ULB before starting construction or demolition or remodeling work. Similarly, service providers are required to prepare a comprehensive waste management plan that covers segregation, storage, collection, reuse, recycling, transportation and disposal of C&D Waste generated within their jurisdiction. Under Rule 6(7) of the C&D Rules, ULBs are required to examine and sanction the waste management

plan of the generators within a period of one month or from the date of approval of building plan, whichever is earlier from the date of its submission.

However, the C&D Rules do not contain the format or provide the details in the waste management plan. As guidance for ULB, this Tripura C&D Waste Management Policy is setting out an overview of the subject matters and topics which should be included in the waste management plan and these can be appropriately included in the bye-laws/directions for management of C&D Waste to be adopted by the ULB. The waste management plan should include the intended plan for separating and recycling waste on site and should describe the proposed site and intended C&D Waste reuse/recovery operations. The other details should include:

1. Demarcated places onsite where different C&D Waste will be sorted and stored for dispatch.

2. Details of contractors/transporters, if any and their planned destinations for different types of C&D Waste other than valuable saleable items like timber, doors and windows and steel.

3. Proposed transit sites and processing facilities for the project's C&D Waste and its distance from the project site.

4. Plans for recycling or reuse of different types of C&D Waste, e.g. jobs which will be kept ready to absorb leftover ready-mix concrete, such as stair treads or paved areas, or soil-cement blocks for filler-walls.

5. Plans with quantities of recycled C&D materials (like aggregate) which will be used in construction, with on-going proof of use.

6. Plans for waste minimization e.g. volumes of prefabricated concrete units which will not generate onsite waste.

7. Identify and provide details of the person or firm ultimately responsible for compliance (like a factory occupier). This may be the architect or builder or contractor or site manager.

8. In addition, projects over the value of specified value such as Rs. 100 crores must appoint an environmental officer whose duties should include:

   a) Site management of waste and construction materials.

   b) Prepare the plan for C&D Waste management and submit to the identified department of the ULB.

   c) Ensuring C&D Waste are properly disposed of as per the prepared plan.

   d) Reduce the overall quantity of C&D Waste due to greater planning leading to waste prevention.

   e) Increase levels of onsite re-use and recycling of C&D Waste.

   f) Compliance with relevant regulations.

From a review of practices in other jurisdictions, it seems that one of the most common and effective tool/incentive to successfully reach recycling targets or comply with C&D Rules is a bond-deposit based approach. This means that a compliance deposit, or bond, is to be paid as performance security when

applying for building permits and/or submitting the waste management plan. Typically, this amount is approximately 1.5 - 5% of the project value, plus non refundable administration fees of approximately 0.5% of the project value. This is refunded as and when minimum recycling requirements or disposal requirements are met. For example, a certain percentage of the bond amount is returned upon receipt of proof from the registered processing facility that a minimum percentage of the waste has been recycled. A comprehensive reporting system is put in place so that checks can be carried out after project completion. Therefore, waste management plans and compliance deposits can result in significant savings in waste disposal costs for projects where correct processes are followed.

The ULB should identify the appropriate governmental department and/or officials to whom the service providers will submit their comprehensive waste management plan. Appropriate guidelines must be issued for the submission and approval of the waste management plan prepared by the service providers. These guidelines must also include enforcement and consequences of contraventions by service providers and should identify the enforcement agency for the same.

12. FINANCIALSUSTAINABILITY

Main sources of revenue for the ULB for C&D Waste Management are (i) user fees which could be collected separately from other taxes/ charges (ii) revenue from sale of by- products from C&D Waste and (iii) fines and penalties collected from the violators. The ULBs should notify rates for user fees/ transportation fees for all kinds of C & D waste generators and should levy and collect the same.

13. PENALTIES

Historically, there have been no and/or marginal fines/penalties for non-compliance of provisions pertaining to management of any stream of municipal solid waste including C&D Waste. Even in cases where there were penalties prescribed, they were rarely enforced by the governmental authorities leading to a lackadaisical attitude among generators, ULB staff, private players and operators of waste processing facilities with respect to compliance with applicable regulations.

In the above context, in order to ensure compliance with C&D Rules, ULBS should frame bye laws/directions for management of C&D Waste and these bye laws/directions should include significant penalties to serve as a deterrent against non-compliance. A list of recommended fines is included as Annexure II to the Tripura C&D Waste Management Policy. Further, it is recommended that the penalties be structured as a waterfall arrangement where penalties increase proportionately for consecutive and repeated non-compliance(s) by the same person. An example of such waterfall mechanism could be twice the fine amount for the second offence and thrice the penalty amount for the third offence and finally, in case of fourth contravention, the ULB should have the power to stop the construction, demolition and/or renovation activity and/or the license issued by it to the person/proprietor/farm etc. for carrying on business. The ULBs could also structure the penalties as a percentage of the project value and/or quantity of C&D Waste dumped in contravention of the C&D Rules. The penalty amounts should be escalated every year by a specified percentage to take into account the inflation and other costs of recovery for the ULB.

ULBs should recover the penalty amounts as per the notified rates prescribed by the ULBs from time to time.

All amounts collected as penalties by and on behalf of the ULB under the bye-laws/directions should be transferred to a separate bank account maintained for funds for solid waste management. These amounts shall be used towards the ULB's operation and maintenance costs for providing C&D Waste management services, salaries of personnel, incentives, grants and other uses as may be considered appropriate by the ULB from time to time.

14. CAPACITY BUILDING AND INFORMATION, EDUCATION & COMMUNICATION (IEC)

The ULBs should arrange training on the C&D Rules, bye-laws/directions, TSPCB guidelines and any other relevant material to all relevant state government officials to ensure they are aware of the literature around C&D Waste management. Different training and awareness modules should be prepared for various levels of government officials bearing in mind the nature of responsibilities and inherent powers under relevant law. This would ensure maximum productivity and efficient use of resources available with the state. The state government should earmark adequate amounts for training and capacity building of all levels of staff at regular intervals. This would depend on the number of staff, length of training, external agencies involved in the training, location and frequency of the training among other factors.

Currently, there exists a lack of awareness among potential market players regarding utilization of C&D Waste products. The ULB should disseminate information regarding the use and benefits of recycled C&D products among different stakeholders including members of the general public. State agencies and private associations such as CREDAI must devise strategies to improve awareness and generate demand for C&D Waste based building material via white-papers, workshops, targeted incentives for first-time users, etc. The

ULB should widely publicize the sources from where the recycled products can be procured.

There should be a separate section on management C&D Waste on the ULB website where the information about C&D Waste including rules, policies, user fees, penalties, details of collection centers/transit sites and processing facilities etc. are available, along with a list of suggestions for waste minimization and an interactive section where useful ideas or experiences can be uploaded and discussed. Incentives for use of recycled material should be publicized through the website.

The ULB should use print and audio/visual media to sensitize the citizens about the issues arising out of C&D Waste being dumped at empty sites or along with other types of waste. The numbers around per day generation and the magnitude of the problem should be publicized and cooperation solicited from the citizens in handling the C&D Waste responsibly. The fact that C&D Waste is a separate waste stream and the available disposal options should be widely publicized using all the modes of mass communication available to the ULB. The ULB shall collaborate with technical experts, non-governmental organizations and builder/developer associations to build the IEC content and disseminate the information.

15. GRIEVANCE REDRESSALMECHANISM

For effective functioning of C&D Waste management systems, a robust complaint redressal system is imperative. This system creates a platform for various stakeholders to voice their complaints regarding C&D Waste management and is an additional monitoring mechanism for the ULB. This system could be enabled through walk-in complaints, phone calls, SMS, online complaints, through postal service and and/or any other mechanism which

the ULB may consider appropriate keeping in mind the population, per capita income, available technologies and quantity of C&D Waste generated. The ULB shall ensure that each grievance is redressed in a timely and efficient manner bearing in mind the type of grievance, inconvenience caused to public and the remedial action proposed to be taken. The ULB officials should make an area-wise periodic (daily, weekly or monthly) report of the number and type of complaints received, action taken including time taken, feedback of the complainant and pending complaints. This should be submitted to the chief executive officer or commissioner of the ULB for review and necessary action. The details of complaints received and action taken should also be available on the ULB website and its office during working hours.

16. Formulation of Bye-Laws / Regulations by the ULBs

Individual ULBs are advised to formulate Bye-Laws / Regulations for management of Construction and Demolition Waste through their Councils within the scope of the Tripura Municipal Act 1994, Construction and Demolition Waste Management Rules, 2016 and the Tripura Construction and Demolition Waste Management Policy, 2019. The Bye-Laws/ Regulations should be notified in the Official Gazette of the Government of Tripura